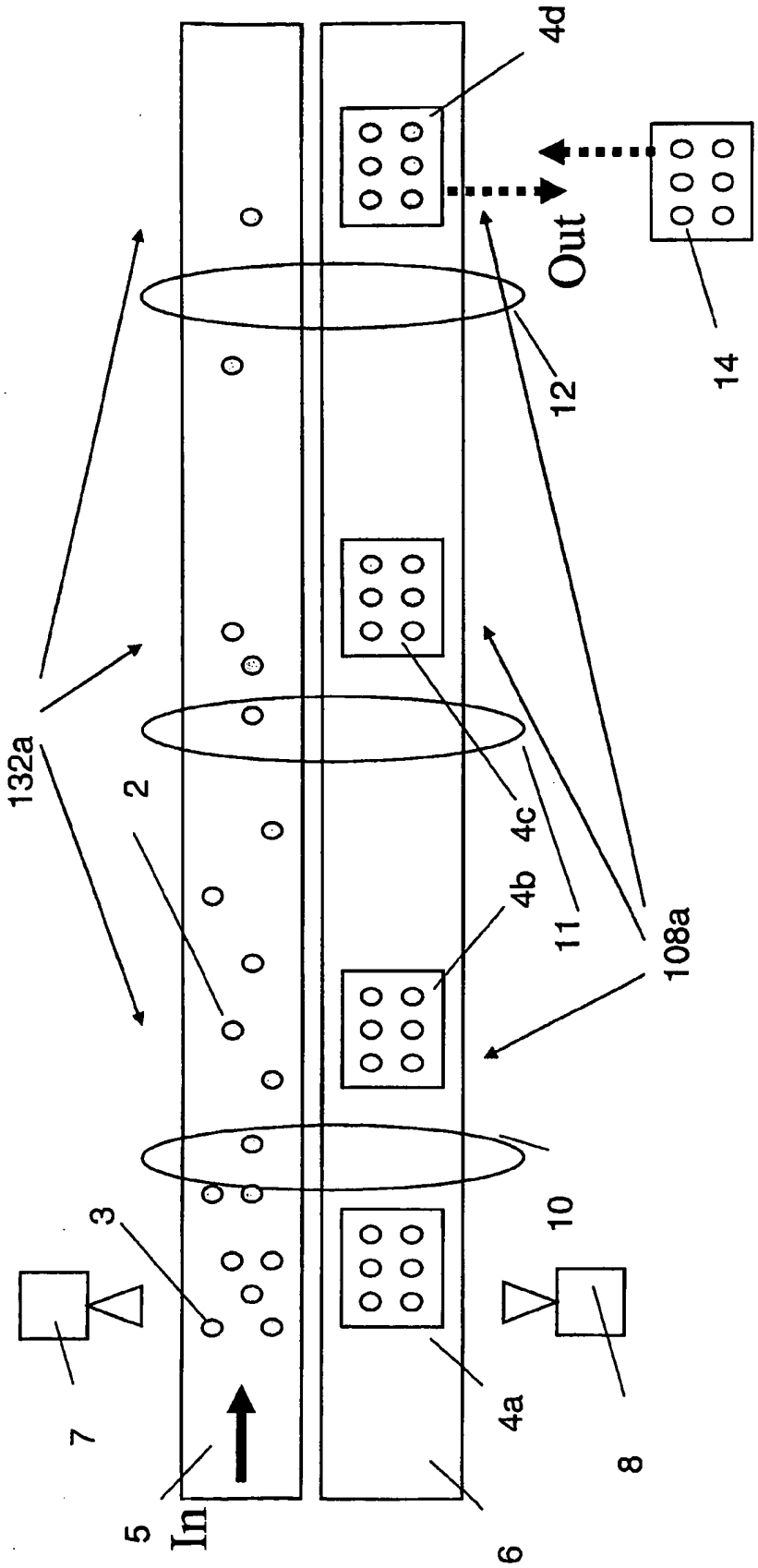

Figure 1

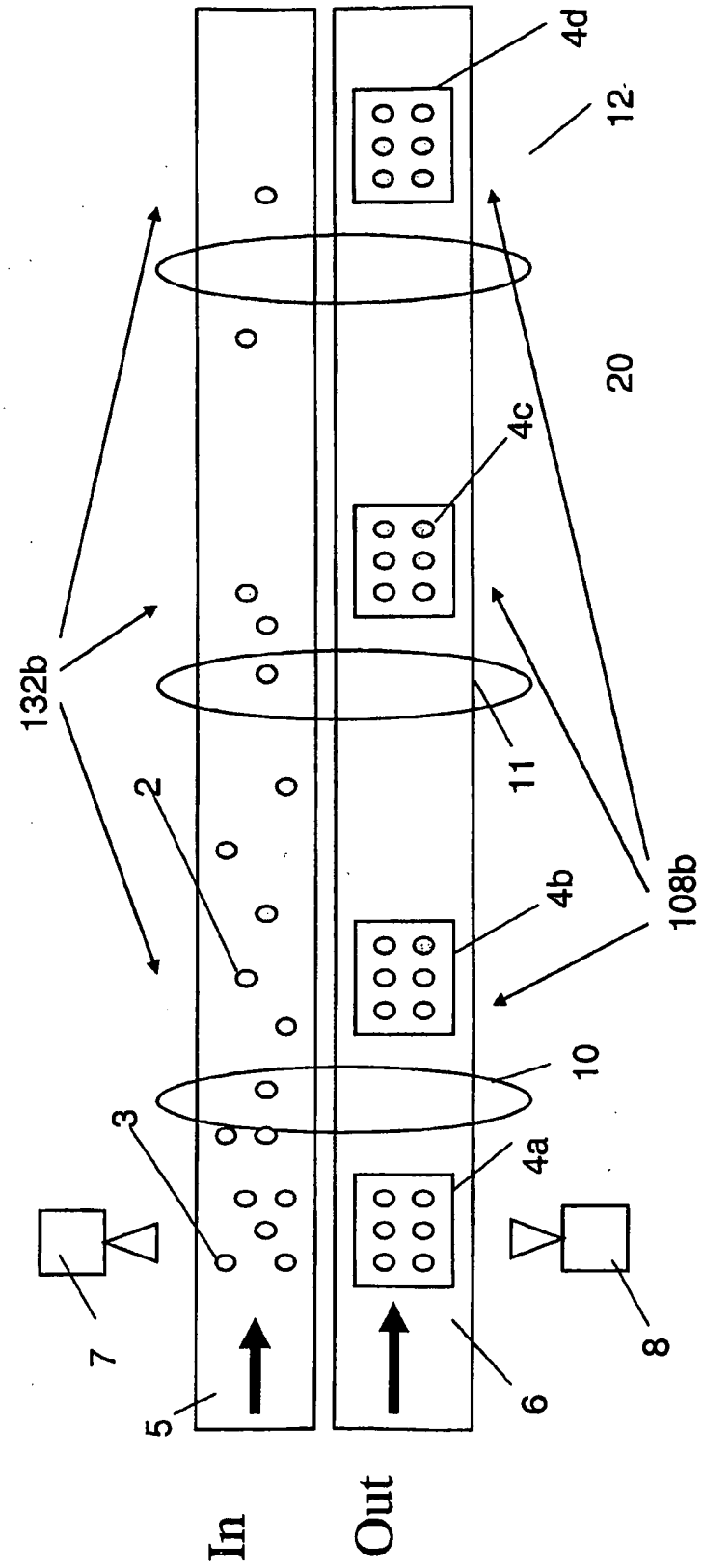

Figure 2

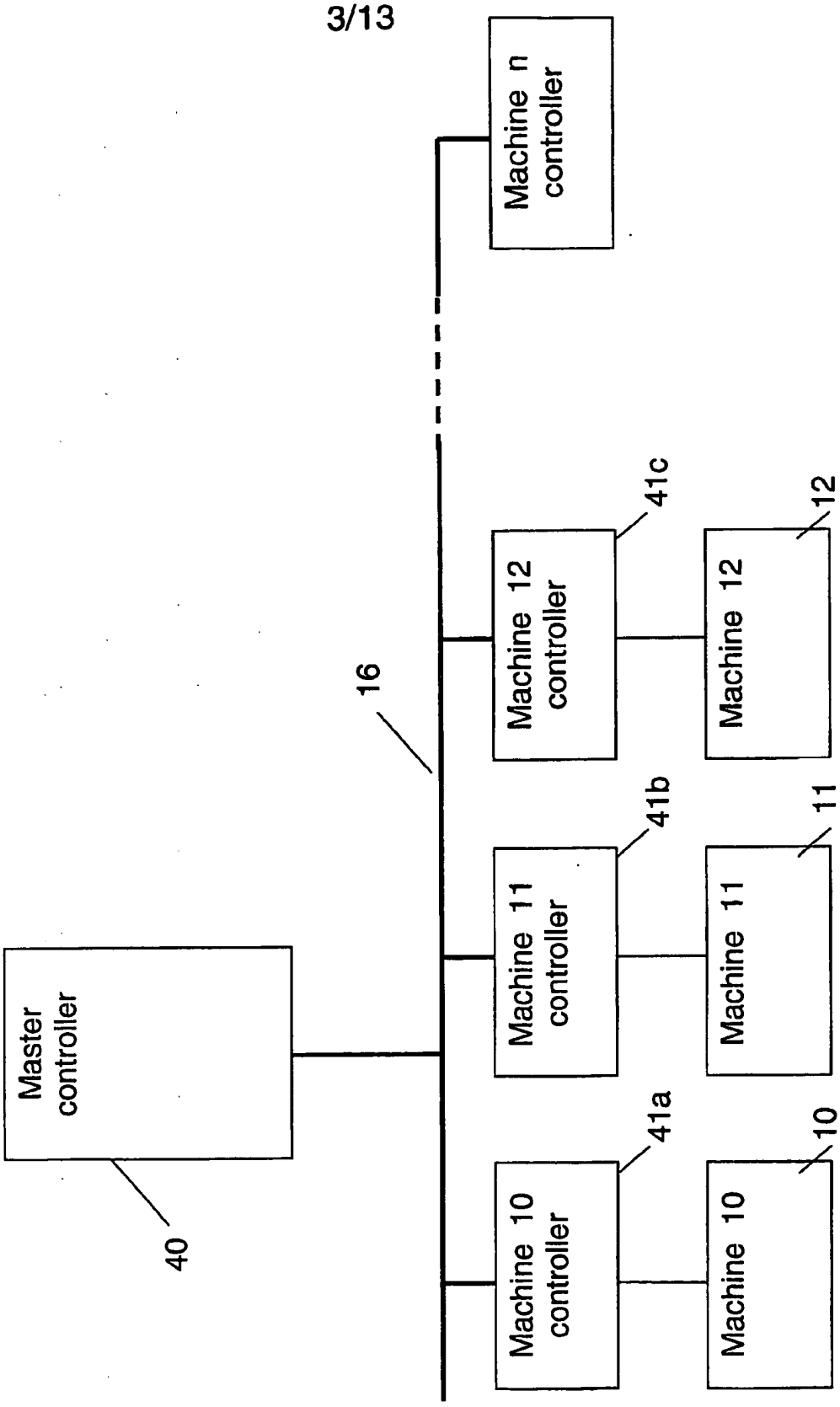
Machine n controller
41c
12
Machine 12 controller
Machine 12
16
41b
11
Machine 11 controller
Machine 11
Master controller
41a
10
Machine 10 controller
Machine 10
40

Figure 3

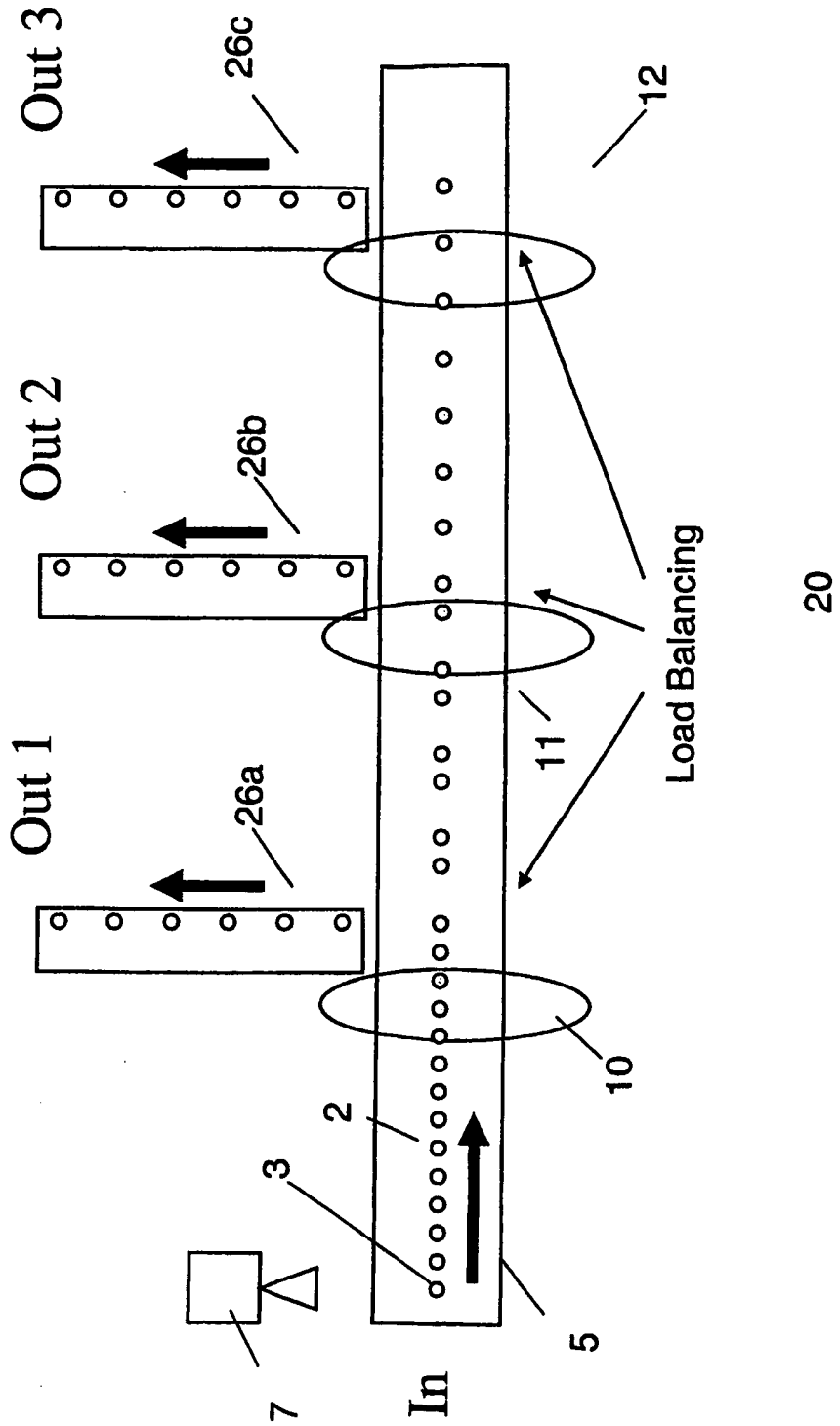

Figure 4

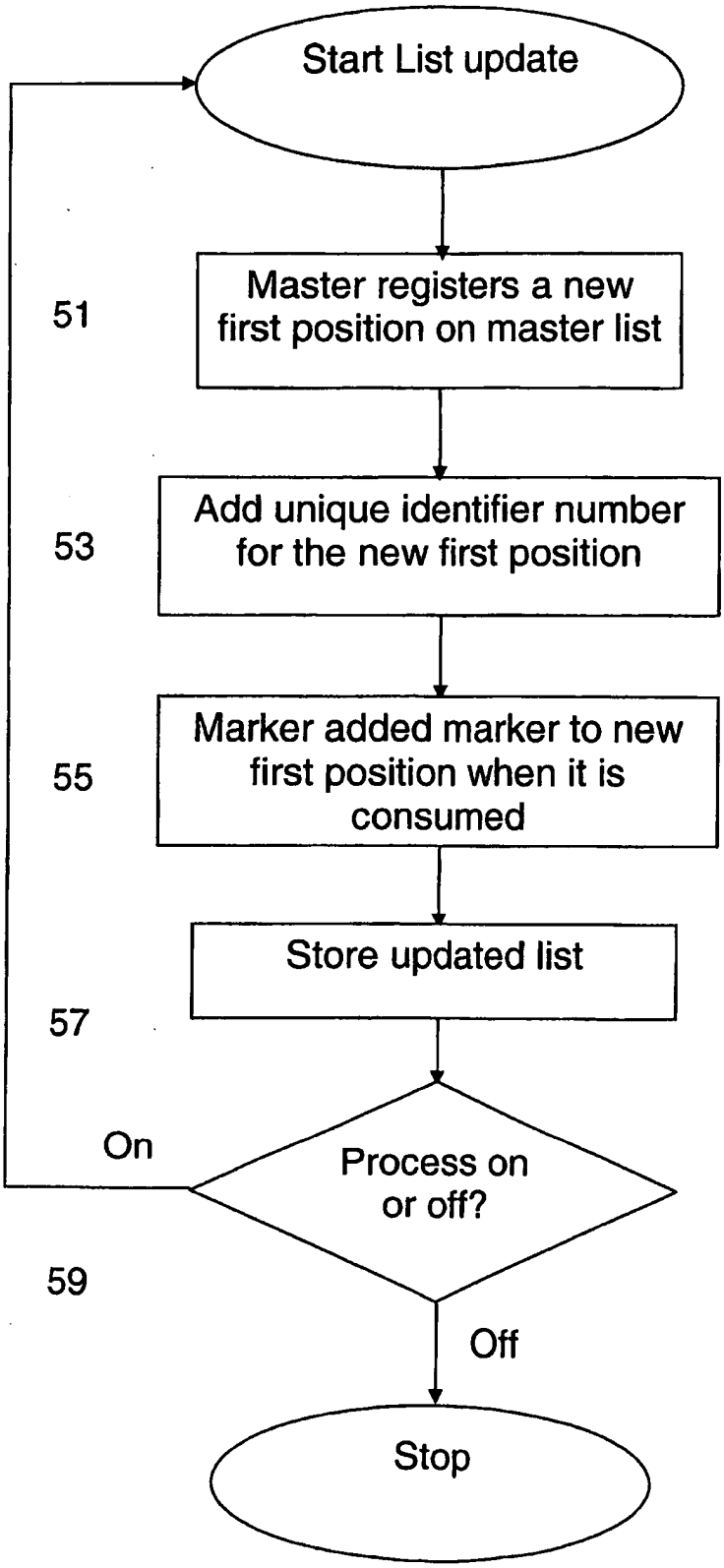
Start List update
Master registers a new first position on master list
51
Add unique identifier number for the new first position
53
Marker added marker to new first position when it is consumed
55
Store updated list
57
Process on or off?
On
59
Off
Stop

Figure 5

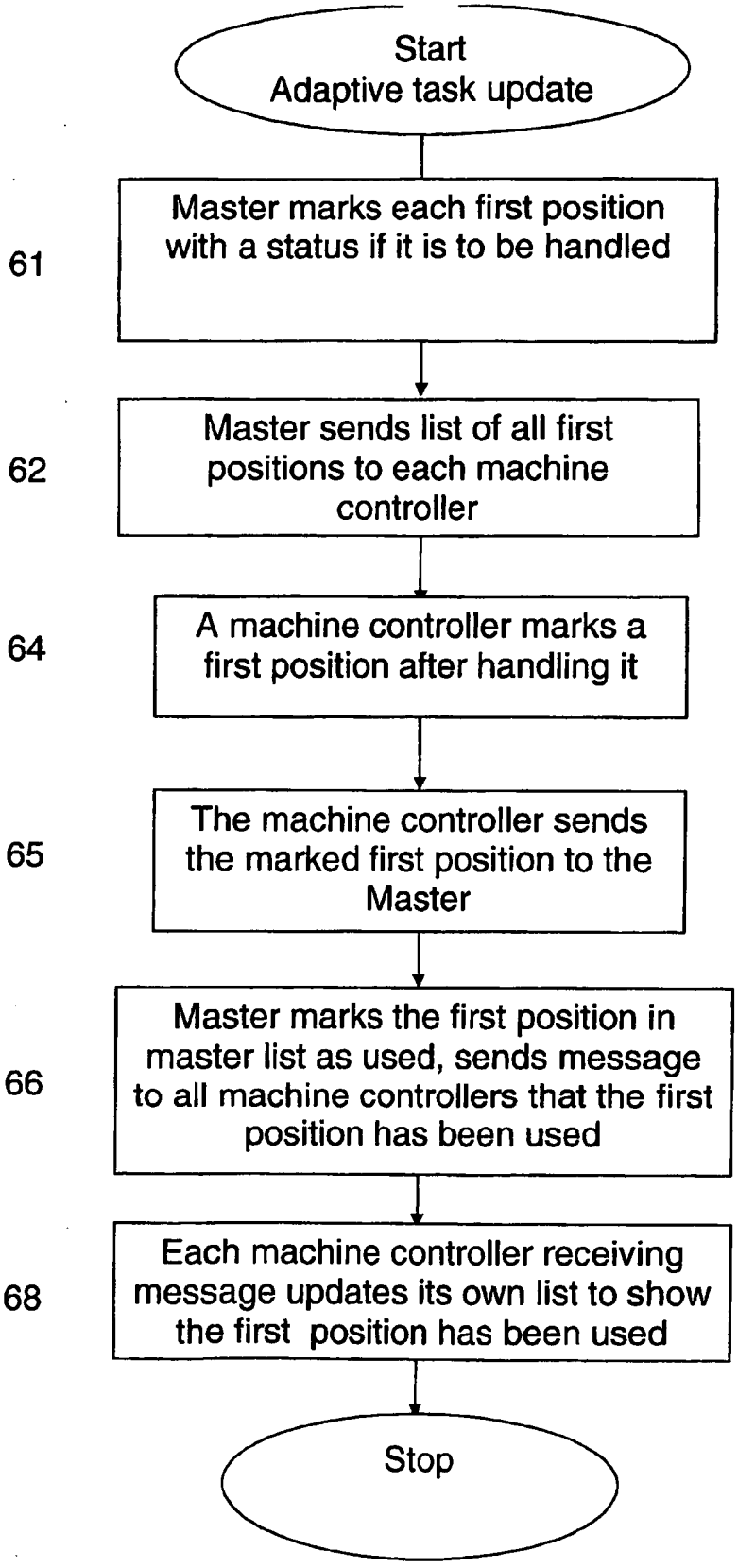
Start
Adaptive task update
Master marks each first position with a status if it is to be handled
61
Master sends list of all first positions to each machine controller
62
A machine controller marks a first position after handling it
64
The machine controller sends the marked first position to the Master
65
Master marks the first position in master list as used, sends message to all machine controllers that the first position has been used
66
Each machine controller receiving message updates its own list to show the first position has been used
68
Stop

Figure 6

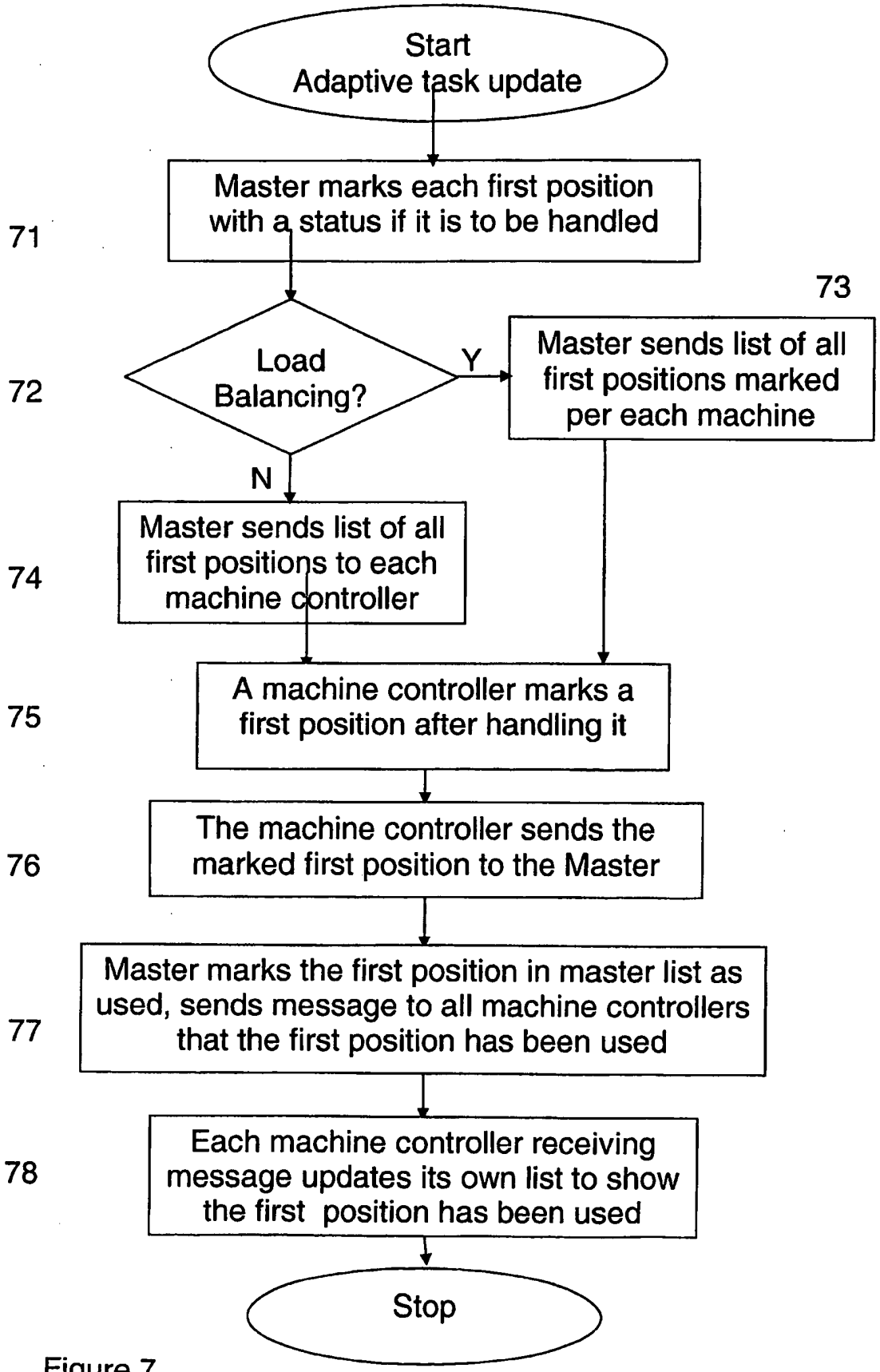
Start
Adaptive task update
Master marks each first position with a status if it is to be handled
71
Load Balancing?
72
Y
N
73
Master sends list of all first positions marked per each machine
Master sends list of all first positions to each machine controller
74
A machine controller marks a first position after handling it
75
The machine controller sends the marked first position to the Master
76
Master marks the first position in master list as used, sends message to all machine controllers that the first position has been used
77
Each machine controller receiving message updates its own list to show the first position has been used
78
Stop

Figure 7

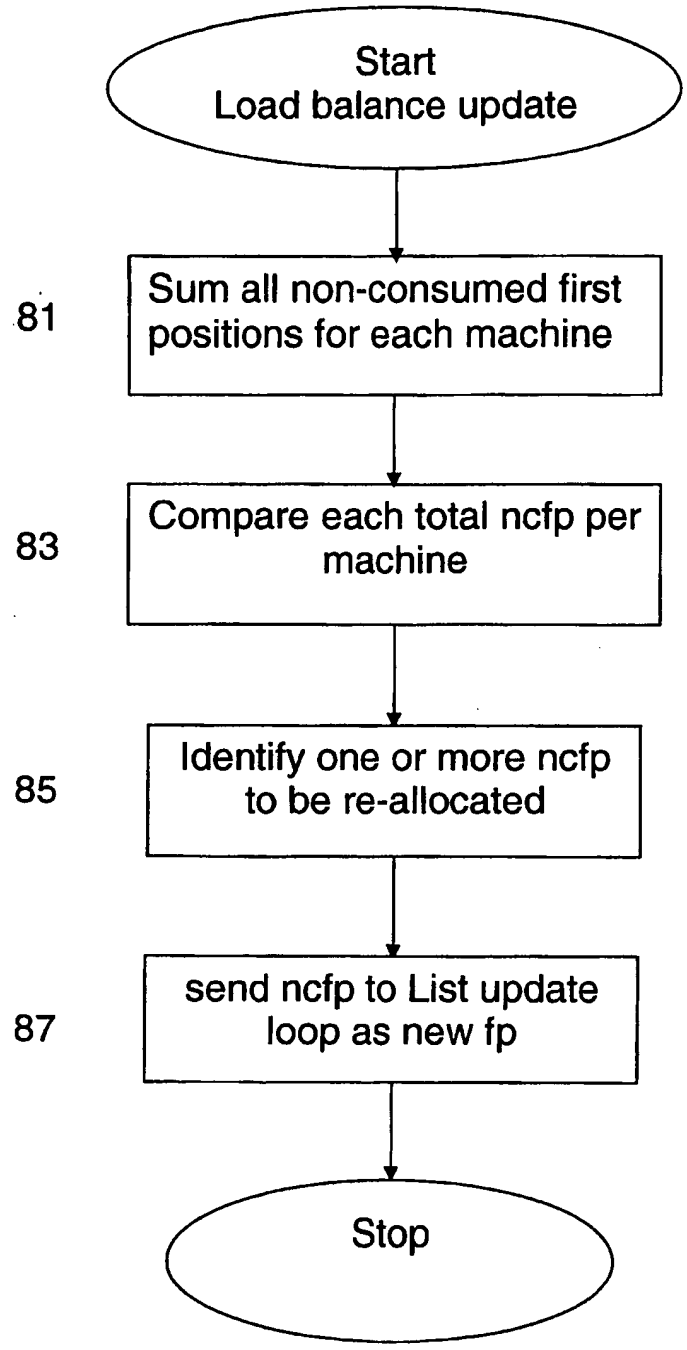
Start
Load balance update
81
Sum all non-consumed first positions for each machine
83
Compare each total ncfp per machine
85
Identify one or more ncfp to be re-allocated
87
send ncfp to List update loop as new fp
Stop

Figure 8

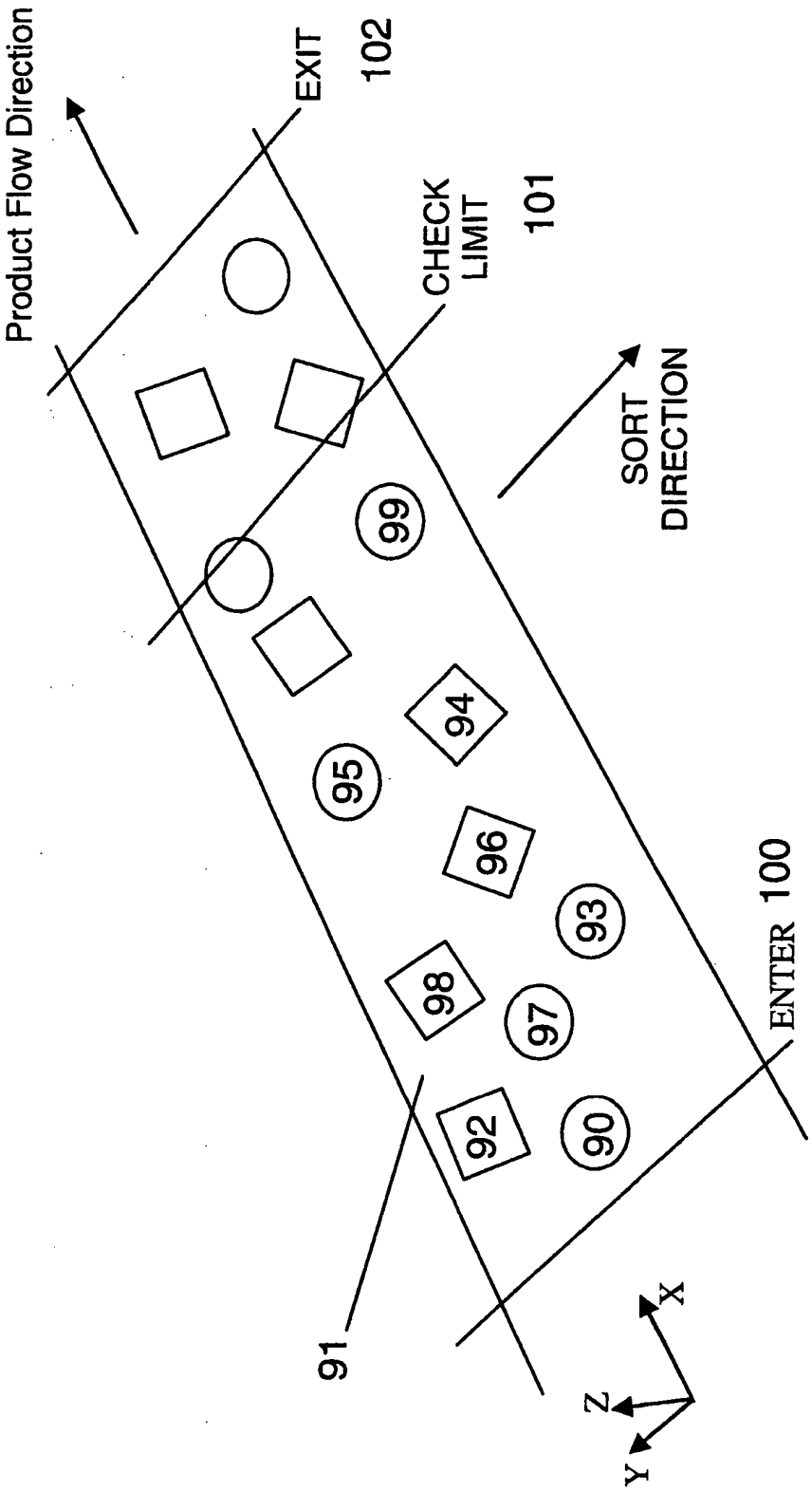
Product Flow Direction
EXIT
102
CHECK LIMIT
101
SORT DIRECTION
99
94
95
96
93
98
97
92
90
91
ENTER
100
X
Z
Y

Figure 9

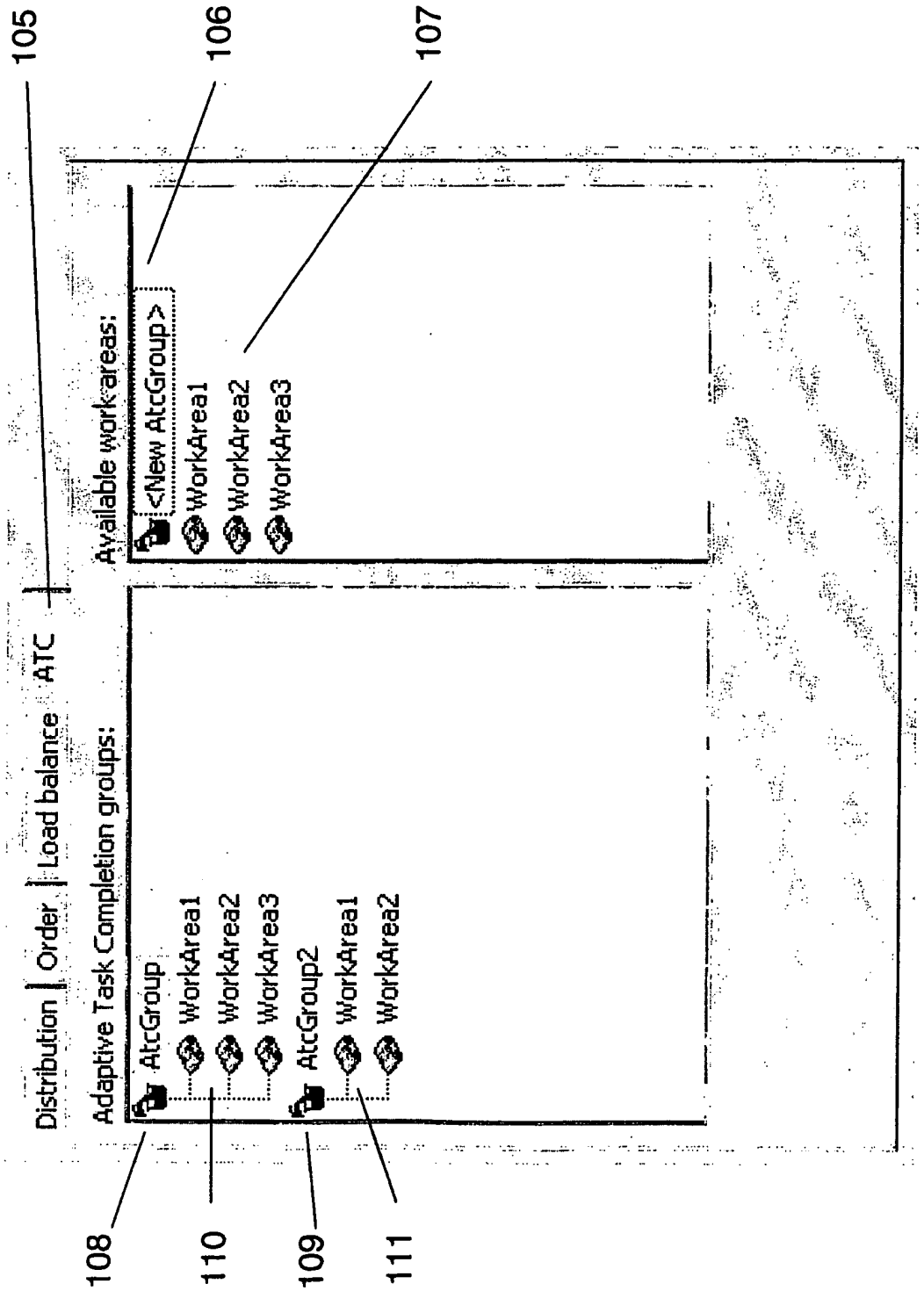
105
106
107
Distribution | Order | Load balance | ATC
Available workareas:
<New AtcGroup>
WorkArea1
WorkArea2
WorkArea3
Adaptive Task Completion groups:
AtcGroup
WorkArea1
WorkArea2
WorkArea3
AtcGroup2
WorkArea1
WorkArea2
108
110
109
111

Figure 10

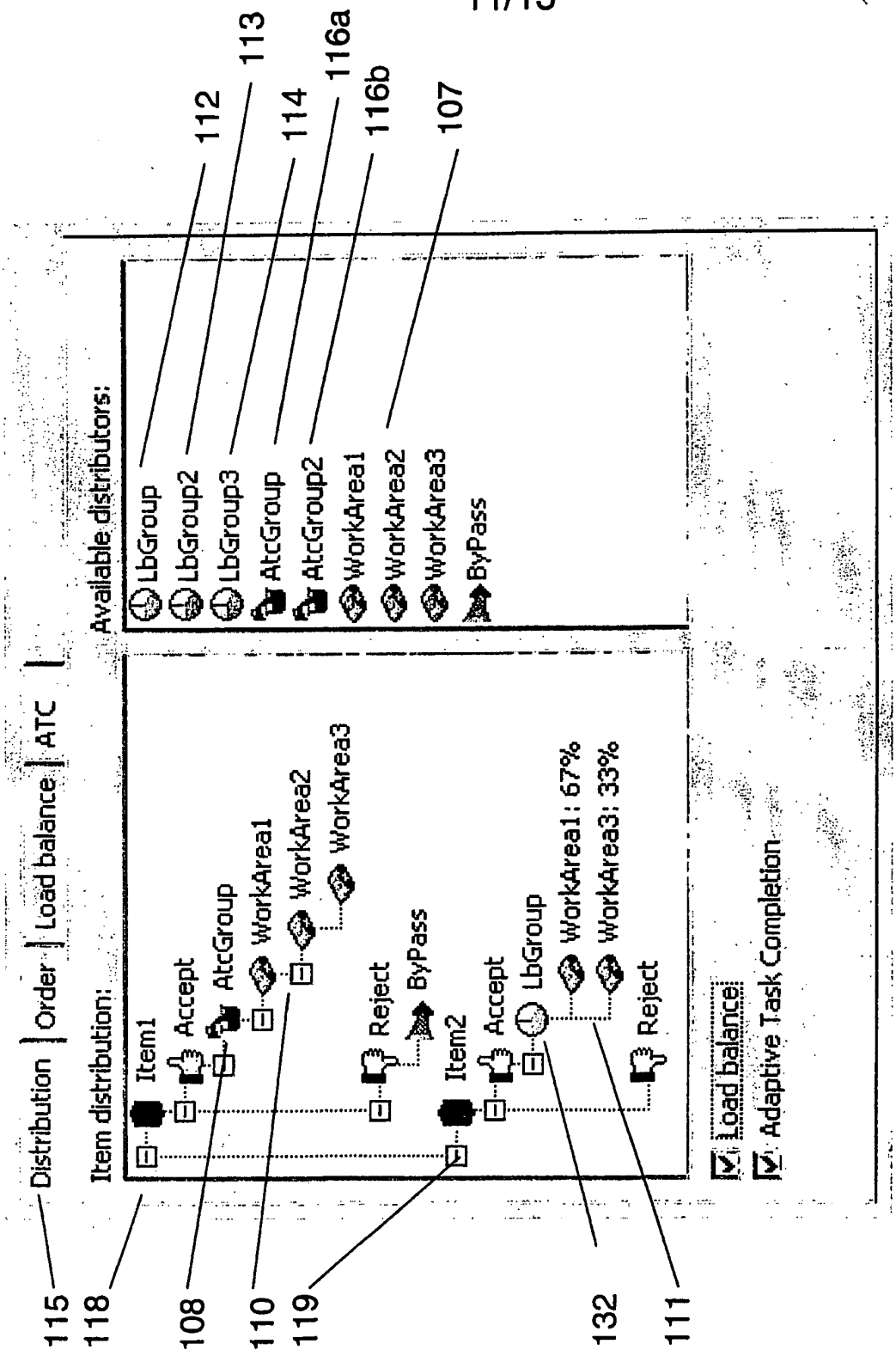
Distribution
Order
Load balance
ATC
Available distributors:
LbGroup
LbGroup2
LbGroup3
AtcGroup
AtcGroup2
WorkArea1
WorkArea2
WorkArea3
ByPass
Item distribution:
Item1
Accept
AtcGroup
WorkArea1
WorkArea2
WorkArea3
Reject
ByPass
Item2
Accept
LbGroup
WorkArea1: 67%
WorkArea3: 33%
Reject
Load balance
Adaptive Task Completion
112
113
114
116a
116b
107
115
118
108
110
119
132
111

Figure 11

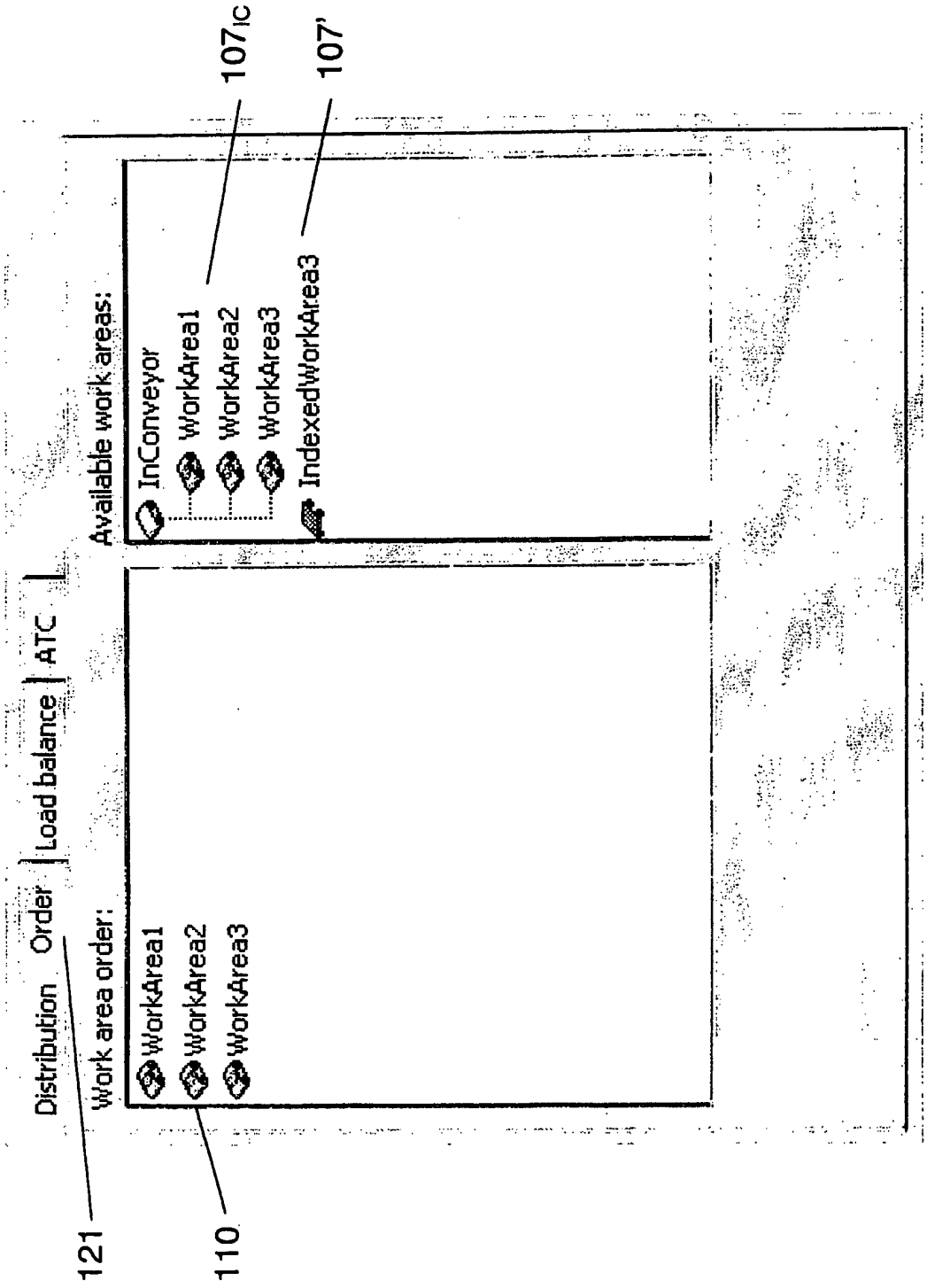
107IC
107'
Available work areas:
InConveyor
WorkArea1
WorkArea2
WorkArea3
IndexedWorkArea3
Distribution
Order
Load balance
ATC
Work area order:
WorkArea1
WorkArea2
WorkArea3
121
110

Figure 12

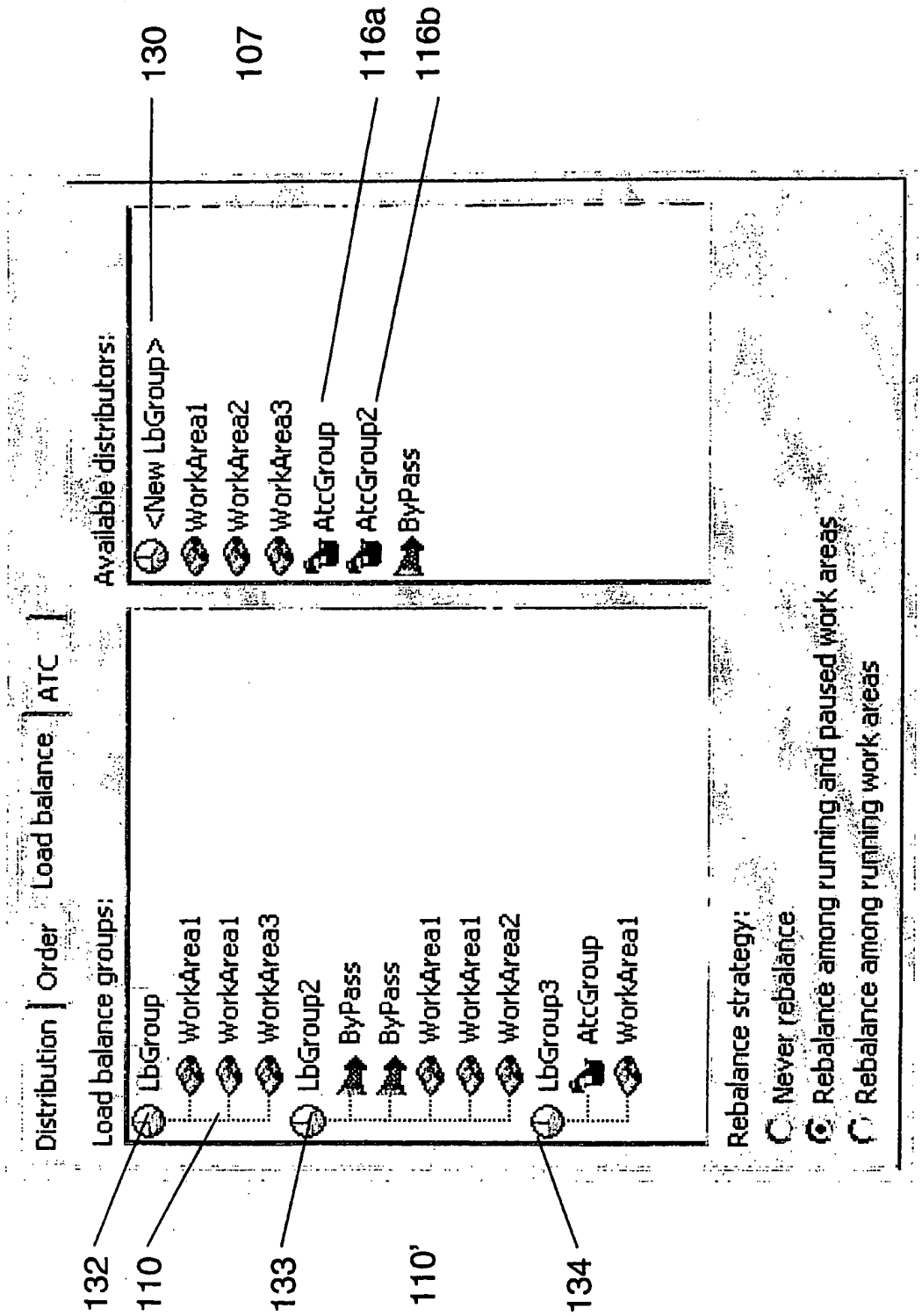
130
107
116a
116b
Distribution
Order
Load balance
ATC
Load balance groups:
LbGroup
WorkArea1
WorkArea1
WorkArea3
LbGroup2
ByPass
ByPass
WorkArea1
WorkArea1
WorkArea2
LbGroup3
AtcGroup
WorkArea1
Available distributors:
<New LbGroup>
WorkArea1
WorkArea2
WorkArea3
AtcGroup
AtcGroup2
ByPass
Rebalance strategy:
Never rebalance
Rebalance among running and paused work areas
Rebalance among running work areas
132
110
133
110'
134

Figure 13